

ANACONDA Minerals Company
555 Seventeenth Street
Denver, Colorado 80202
Telephone 303 293 4000



January 27, 1988

RECEIVED
FEB 05 1988

Mr. Lowell P. Braxton, Administrator
Division of Oil, Gas & Mining
355 West North Temple
3 Triad Center, Suite 350
Salt Lake City, Utah 84189-1203

DIVISION OF
OIL, GAS & MINING

**RE: Carr Fork Reclamation -- Pine Canyon Creek Water Quality and Waterfall
Survey Results**

Dear Mr. Braxton:

As required in our approved Carr Fork Reclamation Plan, enclosed are the surface water monitoring results for the third and fourth sampling quarters of 1987 and a copy of a JBR memorandum which provides a summary of the quarterly Pine Canyon waterfall survey results.

The water quality remained relatively stable during the third and fourth quarters and comparable with previous samples collected over the past twelve months. The water quality within Pine Creek which leaves our property continues to be well within the federal drinking water standards for metals. Only stations SW-8, Pine Creek at the diversion dam downstream of the landfill; and SW 12, Pine Creek at the mouth of Pine Canyon were sampled in October as the stream was dry at the other two stations.

As you will note from review of the JBR memorandum, the headcutting associated with the waterfall located at the mouth of Pine Canyon was minimal over the past four quarters of inspection.

Since the previous quarterly sampling has shown minimal change in the overall water quality in Pine Creek and headcutting of the waterfall, Anaconda requests that the frequency in monitoring for both water quality and waterfall headcutting be reduced to semiannual monitoring over the remaining two years. Anaconda feels that this reduced sampling frequency will help to reduce our overall monitoring costs associated with the project site and will not jeopardize our understanding of the reclamation project's impact on the stream.

If you or your staff have any questions regarding the enclosed analytical and survey reports, or would like to discuss our request for a change in monitoring frequency, please feel free to contact me at (303) 293-7938.

Sincerely,

Robert L. Dent
Minerals Environmental Manager

RLD/das

Enclosures

cc: B. Buck w/o enclosures

*Dave Wham:
Please review and
advise.
Thay June 2/5*

CHEMTECH

CHEMICAL AND BACTERIOLOGICAL ANALYSES

367 SOUTH COMMERCE LOOP
OREM, UTAH 84057
(801) 226-8822

JAN 1 1987
2875 MAIN
SUITE #101
SALT LAKE CITY, UTAH 84115
(801) 483-1162


August 25, 1987

TO: JBR Consultants
1841 E. Fort Union Blvd.
Salt Lake City, UT 84124

DATE SUBMITTED: 8-11-87

CERTIFICATE OF ANALYSIS

SAMPLE ID:	SW-7	SW-8	SW-9	SW-12
LAB #:	<u>U020341</u>	<u>U020342</u>	<u>U020343</u>	<u>U020344</u>
<u>PARAMETER</u>				
Alkalinity as CaCO_3 , mg/l	139	180	182	187
Bicarbonate as HCO_3 , mg/l	169	198	202	213
Carbonate as CO_3 , mg/l	0	10.7	10.0	7.2
Hydroxide as OH, mg/l	0	0	0	0
Chloride as Cl, mg/l	36.5	27.4	27.3	26.4
Fluoride as F, mg/l	2.01	<.1	0.31	0.02
Hardness as CaCO_3 , mg/l	393	257	252	252
Conductivity, umhos/cm	971	541	552	542
pH Units	7.88	8.55	8.50	8.47
Potassium as K, mg/l	25.8	1.0	0.8	1.4
Sodium as Na, mg/l	48.2	20.5	20.6	21.2
Sulfate as SO_4 , mg/l	352	81	61	75
TDS, mg/l	763	380	400	400
Ammonia as $\text{NH}_3\text{-N}$, mg/l	0.12	<.1	<.1	<.1
Nitrate as $\text{NO}_3\text{-N}$, mg/l	1.02	0.86	0.89	0.99
Nitrite as $\text{NO}_2\text{-n}$, mg/l	<.005	<.005	<.005	<.005
Aluminum (D) as Al, mg/l	<.01	<.01	<.01	<.01
Arsenic (D) as As, mg/l	<.01	<.01	<.01	<.01
Barium (D) as Ba, mg/l	<.01	<.01	<.01	<.01


Rex Henderson

CHEMTECH

CHEMICAL AND BACTERIOLOGICAL ANALYSES

367 SOUTH COMMERCE LOOP
OREM, UTAH 84057
(801) 226-8822

2875 MAIN
SUITE #101
SALT LAKE CITY, UTAH 84115
(801) 483-1162

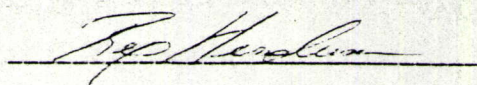
August 25, 1987

TO: JBR Consultants
1841 E. Fort Union Blvd.
Salt Lake City, UT 84124

DATE SUBMITTED: 8-11-87

CERTIFICATE OF ANALYSIS

SAMPLE ID:	SW-7	SW-8	SW-9	SW-12
LAB #:	<u>U020341</u>	<u>U020342</u>	<u>U020343</u>	<u>U020344</u>
<u>PARAMETER</u>				
Boron (D) as B, mg/l	0.12	0.18	0.15	0.22
Cadmium (D) as Cd, mg/l	0.015	<.01	<.01	<.01
Chromium (D) as Cr, mg/l	<.01	<.01	<.01	<.01
Chromium (Hex) as Cr, mg/l	<.01	<.01	<.01	<.01
Copper (D) as Cu, mg/l	0.048	<.01	<.01	<.01
Iron (D) as Fe, mg/l	0.26	0.30	0.32	0.30
Lead (D) as Pb, mg/l	<.01	<.01	<.01	<.01
Manganese (D) as Mn, mg/l	0.12	<.01	<.01	<.01
Mercury (D) as Hg, mg/l	0.00023	<.0002	<.0002	<.0002
Molybdenum (D) as Mo, mg/l	<.01	<.01	<.01	<.01
Nickel (D) as Ni, mg/l	0.060	<.01	<.01	<.01
Selenium (D) as Se, mg/l	<.002	<.002	<.002	<.002
Silver (D) as Ag, mg/l	<.01	<.01	<.01	<.01
Zinc (D) as Zn, mg/l	8.80	<.01	<.01	<.01
Silica as SiO ₂ , mg/l	6.61	7.05	7.11	8.15
TSS, mg/l	1.6	2.8	2.8	4.4
Turbidity, NTU	3.4	1.4	1.3	2.1
Calcium as Ca, mg/l	103	44.3	44.2	45.4
Cations, meq/l	8.18	3.17	3.14	3.24
Anions, meq/l	11.25	6.08	5.72	6.06


Rex Henderson

CHEMTECH

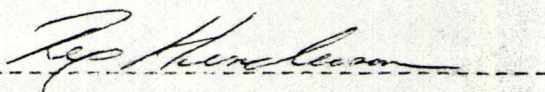
CHEMICAL AND BACTERIOLOGICAL ANALYSES

367 SOUTH COMMERCE LOOP
OREM, UTAH 84057
(801) 226-8822

2875 MAIN
SUITE #101
SALT LAKE CITY, UTAH 84115
(801) 483-1162

CERTIFICATE OF ANALYSIS

SAMPLE IDENTIFICATION	PARAMETER	LEVEL
CLIENT: JBR	Conductivity, umhos/cm.....	519
1841 E. Fort Union Blvd.:	Copper as Cu, mg/l.....	<.01
Salt Lake City, UT 84121:	Fluoride as F, mg/l.....	<.1
LAB NO: U022380	Hardness as CaCO ₃ , mg/l.....	255
DATE SAMPLED: 10-23-87	Hydroxide as OH, mg/l.....	0
TIME SAMPLED: 0915	Iron as Fe (Diss), mg/l.....	0.081
SAMPLED BY: R.P.	Iron as Fe (Tot), mg/l.....	0.28
LOCATION: Anaconda - Carr Fork	Lead as Pb, mg/l.....	<.01
SW-12 (Pine Creek)	Magnesium as Mg, mg/l.....	31.8
COMMENTS: Dissolved Metals	Manganese as Mn, mg/l.....	<.01
.....	Mercury as Hg, mg/l.....	<.0002
PARAMETER	Nickel as Ni, mg/l.....	<.01
LEVEL	Nitrate as NO ₃ -N, mg/l.....	0.46
Alkalinity as CaCO ₃ , mg/l.....	Nitrite as NO ₂ -N, mg/l.....	<.005
183	Phosphate as PO ₄ -P, mg/l.....	<.01
Ammonia as NH ₃ -N, mg/l.....	Potassium as K, mg/l.....	1.7
<.1	Selenium as Se, mg/l.....	0.0022
Arsenic as As, mg/l.....	Silica as SiO ₂ (Diss), mg/l....	8.0
<.01	Silver as Ag, mg/l.....	0.012
Barium as Ba, mg/l.....	Sodium as Na, mg/l.....	16.5
0.055	Sulfate as SO ₄ , mg/l.....	104
Bicarbonate as HCO ₃ , mg/l.....	Total Dissolved Solids, mg/l..	325
217	Turbidity, NTU.....	0.87
Boron as B, mg/l.....	Zinc as Zn, mg/l.....	0.095
0.028	pH Units.....	8.33
Cadmium as Cd, mg/l.....	Cations, meq/l.....	6.83
<.01	Anions, meq/l.....	6.52
Calcium as Ca, mg/l.....		
69.2		
Carbonate as CO ₃ , mg/l.....		
3.1		
Chloride as Cl, mg/l.....		
24.4		
Chromium as Cr (Hex), mg/l....		
<.01		
Chromium as Cr (Tot), mg/l....		
<.01		
Molybdenum as Mo, mg/l.....		
<.01		
Acidity as CaCO ₃ , mg/l.....		
0		



Rex Henderson

CHEMTECH

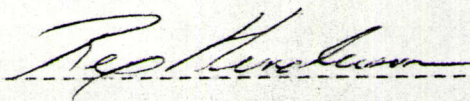
CHEMICAL AND BACTERIOLOGICAL ANALYSES

367 SOUTH COMMERCE LOOP
OREM, UTAH 84057
(801) 226-8822

2875 MAIN
SUITE #101
SALT LAKE CITY, UTAH 84115
(801) 483-1162

CERTIFICATE OF ANALYSIS

SAMPLE IDENTIFICATION	PARAMETER	LEVEL
CLIENT: JBR Consultants	Conductivity, umhos/cm.....	514
1841 E. Fort Union Blvd.	Copper as Cu, mg/l.....	<.01
Salt Lake City, UT 84121	Fluoride as F, mg/l.....	<.1
LAB NO: U022379	Hardness as CaCO ₃ , mg/l.....	253
DATE SAMPLED: 10-23-87	Hydroxide as OH, mg/l.....	0
TIME SAMPLED: @0915	Iron as Fe (Diss), mg/l.....	<.01
SAMPLED BY: R.P.	Iron as Fe (Tot), mg/l.....	0.078
LOCATION: Anaconda - Carr Fork	Lead as Pb, mg/l.....	<.01
SW-8 (Pine Creek)	Magnesium as Mg, mg/l.....	31.8
COMMENTS: Dissolved Metals	Manganese as Mn, mg/l.....	<.01
.....	Mercury as Hg, mg/l.....	<.0002
PARAMETER	Nickel as Ni, mg/l.....	<.01
LEVEL	Nitrate as NO ₃ -N, mg/l.....	0.77
Alkalinity as CaCO ₃ , mg/l.....	Nitrite as NO ₂ -N, mg/l.....	<.005
182	Phosphate as PO ₄ -P, mg/l.....	<.01
Ammonia as NH ₃ -N, mg/l.....	Potassium as K, mg/l.....	1.3
0.12	Selenium as Se, mg/l.....	<.002
Arsenic as As, mg/l.....	Silica as SiO ₂ (Diss), mg/l.....	7.1
0.013	Silver as Ag, mg/l.....	0.018
Barium as Ba, mg/l.....	Sodium as Na, mg/l.....	16.7
0.045	Sulfate as SO ₄ , mg/l.....	53
Bicarbonate as HCO ₃ , mg/l.....	Total Dissolved Solids, mg/l.....	351
220	Turbidity, NTU.....	0.72
Boron as B, mg/l.....	Zinc as Zn, mg/l.....	0.048
0.041	pH Units.....	8.37
Cadmium as Cd, mg/l.....	Cations, meq/l.....	6.72
<.01	Anions, meq/l.....	6.42
Calcium as Ca, mg/l.....		
66.8		
Carbonate as CO ₃ , mg/l.....		
1.2		
Chloride as Cl, mg/l.....		
58.6		
Chromium as Cr (Hex), mg/l.....		
<.01		
Chromium as Cr (Tot), mg/l.....		
<.01		
Molybdenum as Mo, mg/l.....		
<.01		
Acidity as CaCO ₃ , mg/l.....		
0		



Rex Henderson

Memorandum

Date: January 21, 1988

To: Brian W. Buck

From: Elliott W. Lips *EWL*

Re: Pine Canyon Waterfall

A survey point was established on January 28, 1987. The survey control consists of a steel pin cemented into the toe of the slag pile, on the south side of the canyon, approximately 100' upstream of the waterfall. Measurements are made with an aluminum rod configured with a 90 degree junction at one end. The rod is positioned on the ground with the 90 degree junction snugly against the edge of the waterfall. The distance from the edge of the waterfall to the survey pin constitute the data. The stream is braided immediately upstream of the waterfall, and has two branches that spill over the waterfall. These branches are referred to as the left and right branch, as viewed looking downstream.

Measurements of each branch are as follows:

<u>Date</u>	<u>Left Branch</u>	<u>Right Branch</u>
1/28/87 ¹	103' 6"	100' 2"
5/14/87 ¹	99' 10"	99' 4"
8/10/87 ¹	99' 7"	99' 6"
12/4/87 ²	99' 10"	96' 10"

- 1 Measurements by EWL using full survey rod.
- 2 Measurements by RJB using only short half of survey rod, reported lots of vegetation possibly introducing inaccuracy in the measurement.

Summary

In almost one year of quarterly monitoring, the left branch has migrated upstream approximately 3' 8", the right branch approximately 3' 4".

Sketch of Waterfall

